

# Processor Architecture

This unit covers advanced topics within processor architecture. It looks at structures of both uniprocessor systems and multiprocessor systems.

**Overview:** Processor Design: Advanced Topics · Survey of High Performance Architectures · CPU Organization Overview · Advanced Topics in Microarchitecture

**Prerequisites:** Computer Architecture

Topics	References	Tutorials	Patents
Pipelining (Stall, Bubble, Multiple, Flush) [+]		<ul style="list-style-type: none"> <li>• Tutorial: Pipelining</li> <li>• Pipelining</li> <li>• Instruction Pipelining</li> <li>• Advanced Issues in Pipelining</li> </ul>	
Superscalar Architecture [+]	<ul style="list-style-type: none"> <li>• Asynchronous Superscalar Architecture</li> <li>• Superscalar Processor Architecture</li> </ul>	<ul style="list-style-type: none"> <li>• The Superscalar Hardware Architecture of the MC68060, Joseph Circello, Computer Museum History Center, Video (25 minutes), Hot Chips VI - 1994 [8/15/1994 1 PM (Pacific)]</li> </ul>	
VLIW [+]		<ul style="list-style-type: none"> <li>• VLIW/Superscalar Processors</li> </ul>	
Multiprocessors [+]		<ul style="list-style-type: none"> <li>• Multiprocessor Systems</li> <li>• Parallel Processors</li> <li>• Scalable Multiprocessors and the DASH Approach John Hennessy Video (52 minutes) Computer Museum History Center 4/10/1992 1 PM (Pacific)</li> <li>• Cache-Coherent Multiprocessors: an Easy Approach to High- Performance Computing Forest Baskett Video (40 minutes) Computer Museum History Center 10/18/1990 1 PM</li> </ul>	

## Multithreaded Processors [+]

- Multithreading documents list
- M. J. Flynn and A. Podvin, *Shared Resource Multiprocessing*, IEEE Computer, pp. 20-28, March 1972.

(Pacific)

- The MAJC Processor Architecture, Marc Tremblay, Video (60 minutes), Stanford University, [3/29/2000 4:15 AM (Pacific)]

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## Trace Processing [+]

- Reference list
- Trace Processors
- Rotenberg, Eric, *Trace Processors: Exploiting Hierarchy and Speculation*, Doctorial Thesis, University of Wisconsin-Madison, 1999.

- Trace Processors and Control Independence Eric Rotenberg, Video (60 minutes) [4/20/1999 3:30 PM (Pacific)]

## Reconfigurable Processors, FPGA [+]

- Reference list
- DRHW WWW Library
- Adaptive hardware becomes a reality using electrically reconfigurable arrays (ERAs)
- The Nano Processor: a low resource reconfigurable processor
- The implementation of hardware subroutines on field programmable gate arrays

- Reconfigurable Computing

## Memory Hierarchy\* [+]

- Memory Hierarchy in Cache Based Systems
- CPUs combined with bulk memory reference list
- Memory accessing (e.g. prefetch) and RAMBUS reference list

- Memory Hierarchy Overview

## Vector Processors [+]

- Vector Processors Overview
- Vector pipelining, chaining, and speed on the IBM 3090 and Cray X-MP

- Vector Processing

## SIMD [+]

- SIMD Instructions
- SIMD Architectures

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MIMD [+]

- MIMD  
Architectures

**Advanced Units:** Instruction Sets · Memory Data Flow Techniques · Register Data Flow Techniques

\* Denotes a topic that is useful but not necessary.

NORTH: North Online Relational Training Hierarchy  
Developed by: Nick Galotti, Justin Marrese, Maulin Patel, Mike Pyzocha as part of a project for WPI

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# Computer Architecture

Computer Architecture is the study of the interconnection of the various components of a computer. The goal of this unit is to provide detailed information about the architecture of the many components of a computer.

**Overview:** WWW Computer Architecture ·

**Book:** Computer Architecture: A Quantitative Approach  
**Author:** Hennessy and Patterson  
**ISBN:** 1558605967

**Prerequisites:** Micro Processor Systems · VLSI Systems · Operating Systems

Topics	References	Tutorials	Patents
Computer Organization [+]		<ul style="list-style-type: none"><li>• Computer Organization</li><li>• Slides from technical training classes</li></ul>	
Processors and Systems [+]	<ul style="list-style-type: none"><li>• Anatomy of Modern Processors</li></ul>		
I/O Systems [+]		<ul style="list-style-type: none"><li>• I/O Systems</li></ul>	
Memory Systems [+]		<ul style="list-style-type: none"><li>• Memory Systems</li></ul>	
Pipeline Structures [+]		<ul style="list-style-type: none"><li>• Pipelines</li></ul>	

**Advanced Units:** Processor Architecture · Instruction Processing

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